CLAIMS:

What is Claimed is:

1. An optical submount comprising:

a) a crystalline substrate;

b) an anisotropically etched groove in the substrate; and

c) a dry pit intersecting the groove at one end of the groove, wherein the dry pit intersects a wedge area of the groove.

2. The optical submount of claim 1 wherein the dry pit is deeper than the groove.

3. The optical submount of claim 1 wherein the dry pit has a triangular shape aligned symmetrically with the groove.

4. The optical submount of claim 1 wherein the dry pit covers a wedge area of the groove.

5. The optical submount of claim 1 wherein the dry pit is formed before the groove.

6. The optical submount of claim 1 wherein the dry pit includes an etched area to allow for laser beam expansion.

7. The optical submount of claim 1 wherein the dry pit includes a slot for optical device.

8. The optical submount of claim 1 wherein the crystalline substrate is a <100> silicon substrate.

9. A micromachined crystalline substrate comprising:

a) an anisotropically etched groove in the substrate; and

b) a dry pit intersecting the groove at one end of the groove, wherein the dry pit intersects a wedge area of the groove.

10. The substrate of claim 9 wherein the dry pit is formed before the groove.

11. The substrate of claim 9 wherein the dry pit covers a wedge area of the groove.

12. The substrate of claim 9 wherein the dry pit is deeper than the groove.

13. The substrate of claim 9 further comprising a wet pit disposed adjacent to the dry pit and opposite the groove.

14. The substrate of claim 9 wherein the crystalline substrate is a <100> silicon substrate.

15. A micromachined crystalline substrate comprising:

a) a first anisotropically etched groove in the substrate;

b) a second anisotropically etched groove in the substrate, parallel with the first groove; and

c) a dry pit disposed between the first groove and second groove, wherein the dry pit intersects a wedge area of the first groove, and intersects a wedge area of the second groove.

16. The substrate of claim 15 wherein the dry pit is formed before the grooves.

17. The substrate of claim 15 wherein the dry pit covers a wedge area of each groove.

18. The substrate of claim 15 wherein the dry pit is deeper than the first groove and second groove.

19. The substrate of claim 15 wherein the first groove and second groove are in-line.

20. The substrate of claim 15 wherein the crystalline substrate is a <100> silicon substrate.

21. A micromachined crystalline substrate comprising:

a) an anisotropically etched groove in the substrate; and

b) a dry pit intersecting the groove at one end of the groove, wherein the dry pit intersects the groove at an angles of 45 degree or less, so that a wedge is not present in the groove adjacent to the dry pit.

22. The substrate of claim 21 wherein the dry pit is formed before the groove.

23. The substrate of claim 21 wherein the dry pit is deeper than the groove.

24. The substrate of claim 21 wherein the crystalline substrate is a <100> silicon substrate.

25. A micromachined crystalline substrate comprising:

a) a first anisotropically etched groove in the substrate;

b) a second anisotropically etched groove in the substrate, perpendicular with the first groove and joined with the first groove; and

c) a dry pit disposed at a convex corner location where the first and second grooves meet.

26. The substrate of claim 25 wherein the dry pit is formed before the grooves.

27. The substrate of claim 25 wherein the dry pit is deeper than the first groove and second groove.

28. The substrate of claim 25 wherein the dry pit covers a convex corner location defined by the first and second grooves.

29. The substrate of claim 25 wherein the crystalline substrate is a <100> silicon substrate.

30. A micromachined crystalline substrate comprising:

a) an anisotropically etched wet pit in the substrate;

b) a U-shaped dry pit intersecting the wet pit; and

c) a U-area inside the U-shaped dry pit, wherein the U-shaped dry pit is disposed so that the U-area is not part of the wet pit.

31. The substrate of claim 30 wherein the dry pit is formed before the wet pit.

32. The substrate of claim 30 wherein the dry pit is deeper than the wet pit.

33. The substrate of claim 30 wherein the wet pit is deeper than the dry pit.

34. The substrate of claim 30 further comprising a laser disposed on the U-area, and a ball lens disposed in the wet pit.

35. The substrate of claim 30 wherein the crystalline substrate is a <100> silicon substrate.

36. A method for micromachining crystalline substrate comprising the steps of:

a) forming a dry pit;

b) coating the dry pit with a hard mask material resistant to a anisotropic wet etchant for silicon; and

c) anisotropically wet etching an area adjacent to the dry pit.

37. The method of claim 36 wherein the dry pit is formed by deep reactive ion etching, plasma etching, ion beam milling, or laser-chemical etching.

38. The method of claim 36 wherein step (c) is performed with KOH or EDP.

39. The method of claim 36 wherein the hard mask material is silicon dioxide or silicon nitride.

40. The substrate of claim 36 wherein the crystalline substrate is a <100> silicon substrate.

41. A method for micromachining <100> silicon comprising the steps of:

a) defining three areas of a substrate: an unetched area, a dry etch area, and a wet etch area, wherein the dry etch area and the wet etch area are adjacent;

b) forming an SiO2 layer over the unetched and wet etch areas of a substrate, forming silicon nitride on the SiO2 in the wet etch area, wherein the dry etch area is uncovered;

c) dry etching the dry etch area to form a dry pit;

d) oxidizing the substrate to form a SiO2 layer in the dry pit;

e) removing the silicon nitride and thinning the SiO2 to expose the wet etch area; and

f) wet etching the wet etch area.

42. The method of claim 41 further comprising the step of removing SiO2 after step (f).

43. A method for micromachining <100> silicon comprising the steps of:

a) defining three areas of a substrate: an unetched area, a dry etch area, and a wet etch area, wherein the dry etch area and the wet etch area are adjacent;

b) forming a silicon nitride+SiO2 layer over the unetched area, with the SiO2 on top, forming an SiO2 layer over the wet etch area, wherein the dry etch area is uncovered;

c) dry etching the dry etch area to form a dry pit;

d) conformally coating the substrate with a hard mask material to form a hard mask layer in the dry pit;

e) removing the SiO2 from the substrate so that the wet etch area is exposed; and

f) wet etching the wet etch area.

44. The method of claim 43 further comprising the step of removing hard mask material after step (f).

45. The method of claim 43 wherein the hard mask material is CVD nitride.

46. A method for micromachining <100> silicon comprising the steps of:

a) defining three areas of a substrate: an unetched area, a dry etch area, and a wet etch area, wherein the dry etch area and the wet etch area are adjacent;

b) forming a photoresist layer over the unetched area, forming a hard mask layer over the wet etch area, wherein the dry etch area is uncovered;

c) dry etching the dry etch area to form a dry pit;

d) removing the photoresist;

e) oxidizing the substrate to form a SiO2 layer in the dry pit;

f) removing the hard mask to expose the wet etch area; and

f) wet etching the wet etch area.

47. The method of claim 46 wherein the hard mask material comprises silicon nitride.

48. The method of claim 46 further comprising the step of removing SiO2 after step (g).